

AD-A041 591 OGDEN AIR LOGISTICS CENTER HILL AFB UTAH PROPELLANT L--ETC F/G 21/9.2
PROPELLANT SURVEILLANCE REPORT LGM-30 A AND B STAGE I TP-H1011.(U)
APR 77 J A THOMPSON
MANCP-367(77)

UNCLASSIFIED

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2 OF 2
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*** SAMPLE SITE SUMMARY ***

AGE (MONTHS)	NR. SAMPLES	AGE (MONTHS)	NR. SAMPLES	AGE (MONTHS)	NR. SAMPLES
84.0	2	112.0	9	137.0	47
87.0	1	113.0	11	138.0	24
88.0	2	114.0	4	139.0	17
89.0	3	115.0	25	140.0	26
91.0	3	116.0	15	141.0	12
92.0	1	117.0	17	142.0	24
93.0	3	118.0	23	143.0	16
94.0	2	119.0	18	144.0	7
95.0	2	120.0	19	145.0	3
96.0	1	121.0	12	146.0	4
97.0	5	122.0	10	147.0	2
98.0	5	123.0	36	148.0	2
99.0	8	124.0	15	149.0	3
100.0	7	125.0	30	157.0	3
101.0	10	126.0	24	160.0	3
102.0	8	127.0	39	161.0	3
103.0	5	128.0	30	163.0	6
104.0	10	129.0	27	165.0	6
105.0	6	130.0	21	166.0	6
106.0	7	131.0	27	167.0	6
107.0	11	132.0	15	169.0	3
108.0	16	133.0	11	170.0	6
109.0	16	134.0	14	171.0	3
110.0	4	135.0	19	172.0	3
111.0	4	136.0	29		

84

STAGE 1, WING 152, PRESSURE TIME, MAXIMUM PRESSURE

This sample size summary is applicable to figures 51 and 52

STORAGE CONDITIONS = AMB TEMP/RH **TEST CONDITIONS = TEST COND 500 PS**

PARAMETER = MAXIMUM PRESSURE
UNIT OF MERSURE = PSI

PARAMETER = MAXIMUM PRESSURE

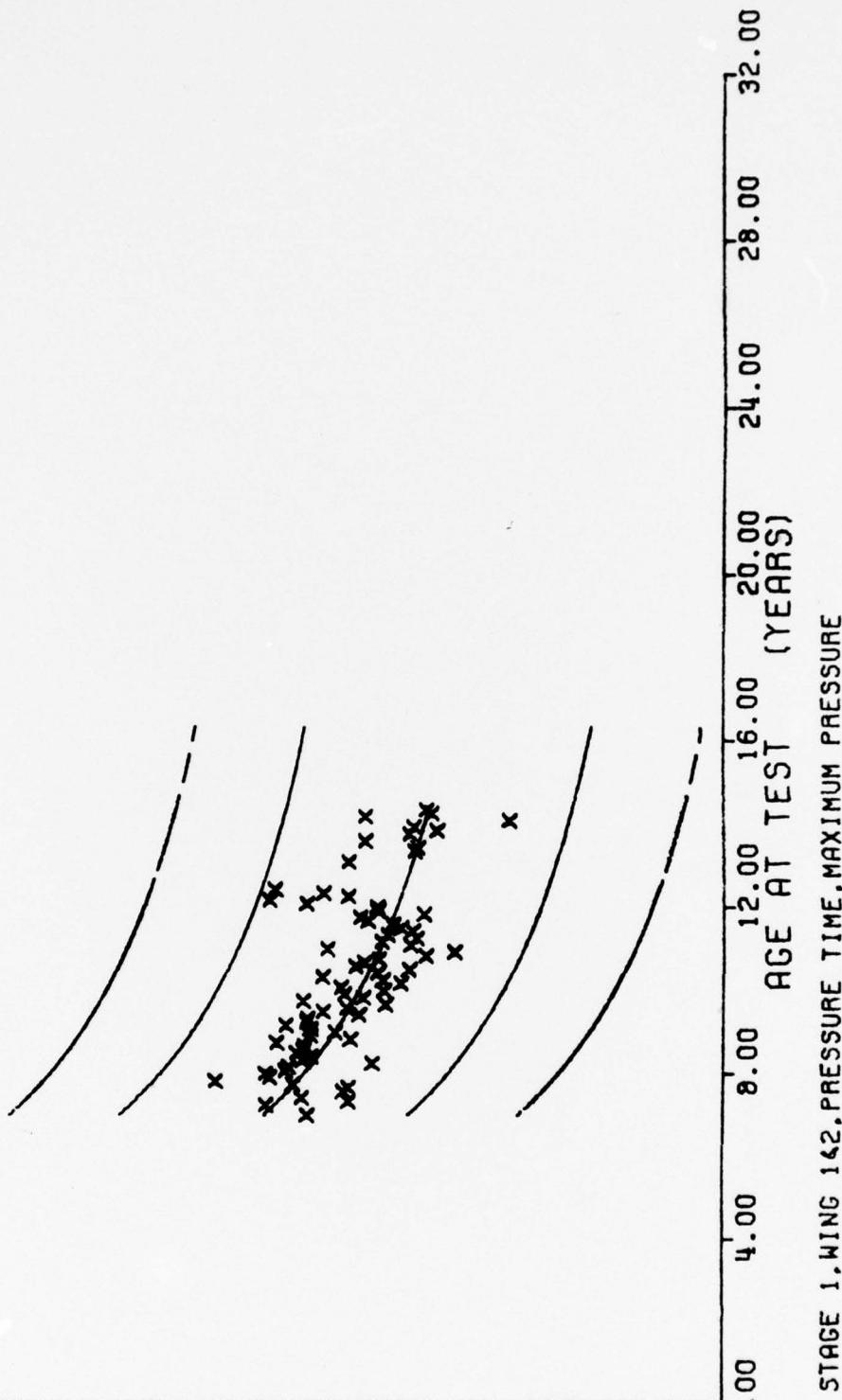


FIGURE 51

$\gamma = ((+6.2287226E-01) + (+2.3701209E-04) * \lambda)$
 $F = +4.8436227E+00$ SIGNIFICANCE OF F = SIGNIFICANT
 $R = +7.4238528E-02$ SIGNIFICANCE OF R = SIGNIFICANT
 $t = +2.2006232E+00$ SIGNIFICANCE OF t = SIGNIFICANT
 $N = 876$ DEGREES OF FREEDOM = 874
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = TEST COND 500 PS

PARAMETER = TIME TO MAX PRESS
 UNIT OF MEASURE = SECONDS

70.00 46 0.56 0.64 0.72 0.80



70.00 46 0.56 0.64 0.72 0.80
 48 12.00 AGE AT TEST (YEARS) 16.00 20.00 24.00 28.00 32.00

STAGE 1, WING 1&2, PRESSURE TIME, TIME TO MAXIMUM PRESSURE

FIGURE 52

*** SAMPLE SIZE SUMMARY ***

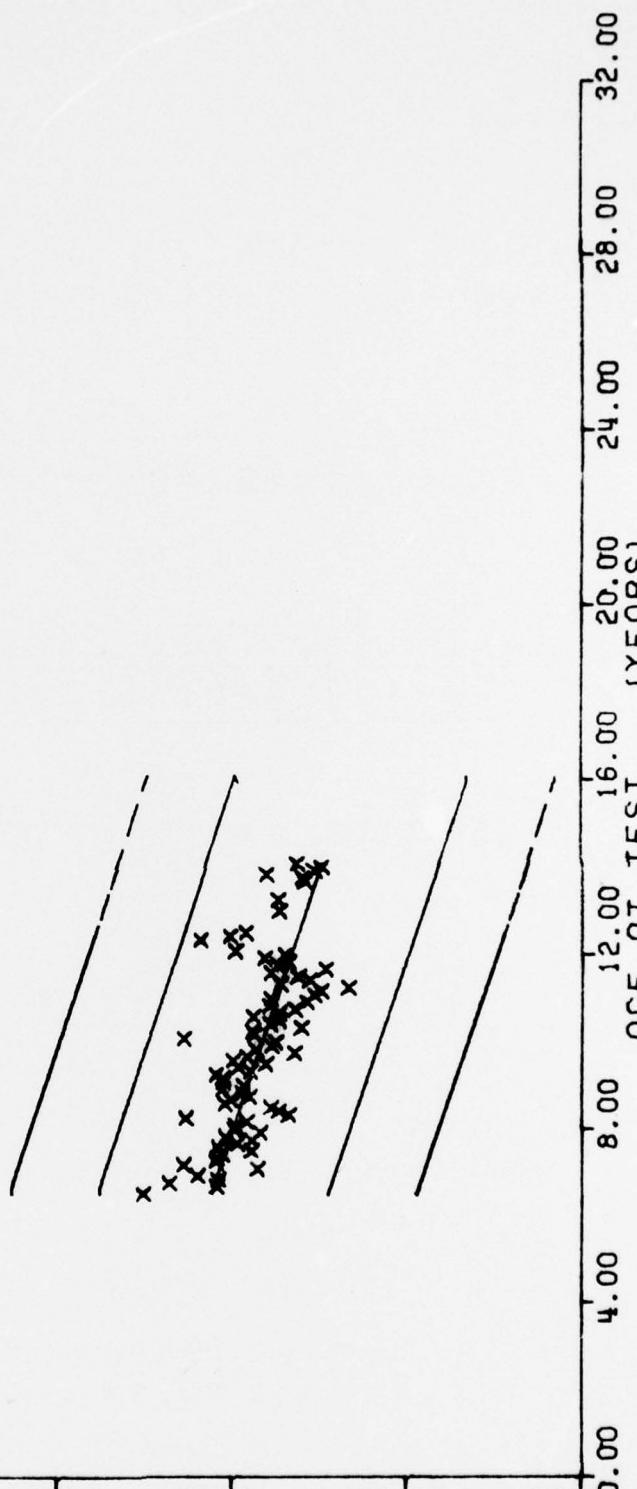
AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
78.0	3	105.0	21	130.0	24	167.0	3
80.0	8	106.0	18	131.0	21	168.0	6
81.0	3	107.0	21	132.0	12	169.0	6
92.0	3	108.0	18	133.0	26		
93.0	9	109.0	15	134.0	36		
95.0	3	110.0	9	135.0	9		
86.0	3	111.0	24	136.0	51		
87.0	9	112.0	27	137.0	45		
88.0	12	113.0	21	138.0	33		
89.0	6	114.0	21	139.0	48		
90.0	3	115.0	18	140.0	18		
91.0	14	116.0	18	141.0	18		
92.0	15	117.0	45	142.0	9		
93.0	3	118.0	21	143.0	9		
94.0	3	119.0	18	144.0	9		
95.0	12	120.0	24	145.0	6		
96.0	9	121.0	18	146.0	3		
97.0	3	122.0	18	148.0	9		
98.0	9	123.0	26	149.0	3		
99.0	6	124.0	21	150.0	3		
100.0	6	125.0	24	156.0	3		
101.0	15	126.0	35	159.0	6		
102.0	18	127.0	23	164.0	3		
103.0	18	128.0	36	165.0	6		
104.0	15	129.0	29	166.0	3		

STAGE 1. WING AEB. TP-H1011. BURNING RATE 1000 PSI

This sample size summary is applicable to figure 53

$F = +1.1997331E+02$
 $R = -3.0113884E-01$
 $t = +1.0953292E+01$
 $N = 1205$
 $F = +1.4598536E-01$
 $R = -2.7786371E-04$
 $t = +1.6217147E-02$
 $S_a = +2.5368192E-05$
 $S_r = +1.5470778E-02$
 $Degrees of Freedom = 1203$
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = 1000 PSI

PARAMEETER = BURNING RATE
 UNIT OF MEASURE = IN/SEC
 0.24 0.28 0.32 0.36 0.40 0.44



STAGE 1. WING A&B. TP-H1011. BURNING RATE 1000 PSI

FIGURE 53

NEW SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NO. SAMPLES	AGE (MONTHS)	NO. SAMPLES	AGE (MONTHS)	NO. SAMPLES
12.0	10	114.0	12	129.0	11
89.0	1	115.0	6	140.0	4
91.0	2	116.0	10	141.0	5
92.0	4	117.0	6	142.0	5
93.0	1	118.0	6	143.0	7
94.0	3	119.0	12	144.0	5
95.0	3	120.0	8	145.0	2
96.0	3	121.0	8	146.0	3
97.0	4	122.0	9	148.0	2
98.0	4	123.0	12	159.0	1
99.0	10	124.0	5	161.0	1
100.0	7	125.0	11	162.0	1
101.0	10	126.0	9	163.0	1
102.0	8	127.0	11	165.0	2
103.0	9	128.0	8	166.0	2
104.0	9	129.0	4	169.0	1
105.0	6	130.0	6	169.0	1
106.0	10	131.0	7	171.0	2
107.0	7	132.0	5		
108.0	12	133.0	9		
109.0	6	134.0	11		
110.0	8	135.0	8		
111.0	8	136.0	6		
112.0	12	137.0	8		
113.0	7	138.0	15		

STAGE 1 WING 162 TP-H131: IGNITABILITY. IGN THRESHOLD POINT, 168 CAL/50 CM²/SEC

This sample size summary is applicable to figure 54

$F = +7.0659453E-02$
 $R = -1.2788150E-02$
 $t = +2.6581845E-01$
 $N = 434$
 STORAGE CONDITIONS = RMB TEMP/RH

$\gamma = ((+6.1921518E+01) + (-5.0982735E-03)) * X$
 SIGNIFICANCE OF F = NOT SIGNIFICANT
 SIGNIFICANCE OF R = NOT SIGNIFICANT
 SIGNIFICANCE OF t = NOT SIGNIFICANT

$S_1 = +9.1103220E+00$
 $S_0 = +1.9179531E-02$
 $S_t = +9.1201144E+00$

DEGREES OF FREEDOM = 432

TEST CONDITIONS = 168 CAL/SQCM/SEC

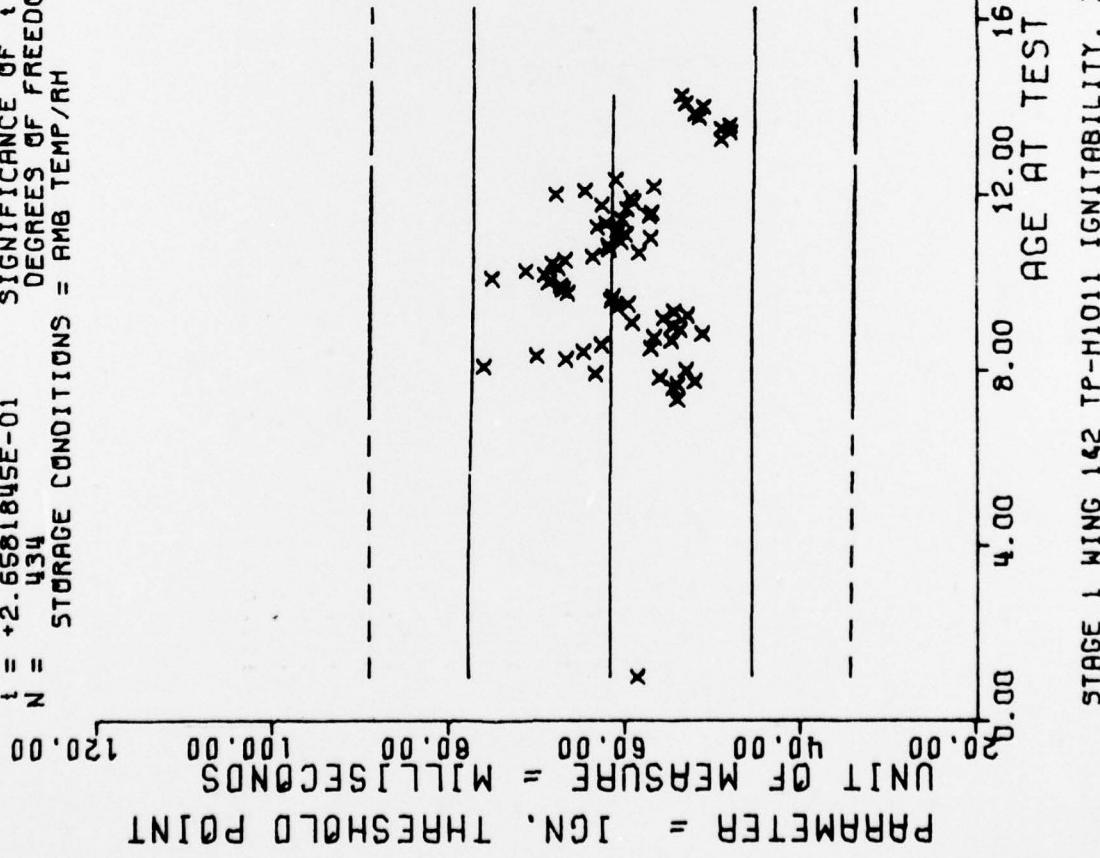


FIGURE 54

*** * SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	NR SAMPLES	AGE (MONTHS)	NR SAMPLES
48.0	3	140.0	23
105.0	12	141.0	15
106.0	6	142.0	9
108.0	24	143.0	3
110.0	12	144.0	5
112.0	12	145.0	5
114.0	6	146.0	7
115.0	12	147.0	6
116.0	15	148.0	3
120.0	5	156.0	3
121.0	9	159.0	9
124.0	16	163.0	3
125.0	15	164.0	3
126.0	3	165.0	4
127.0	21	166.0	1
128.0	19	167.0	6
129.0	11	168.0	5
130.0	9		
131.0	9		
132.0	12		
135.0	7		
		136.0	11
		137.0	14
		138.0	6
		139.0	22

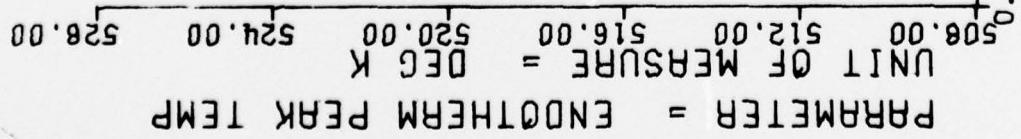
+ 91 -

STAGE I WING 162 DIFFERENTIAL SCANNING CALORIMETER ENDOTHERM PEAK TEMP

This sample size summary is applicable to figures 55 thru 57

$\gamma = \{ \{ +5.1755606E+02 \} + \{ -1.9044618E-04 \} * X \}$
 $F = \text{SIGNIFICANCE OF } F$
 $F = \text{NOT SIGNIFICANT}$
 $R = \text{SIGNIFICANCE OF } R$
 $R = \text{NOT SIGNIFICANT}$
 $S = \text{SIGNIFICANCE OF } S$
 $S = \text{NOT SIGNIFICANT}$
 $S_e = \text{DEGREES OF FREEDOM} = 397$
 $N = 399$

STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH

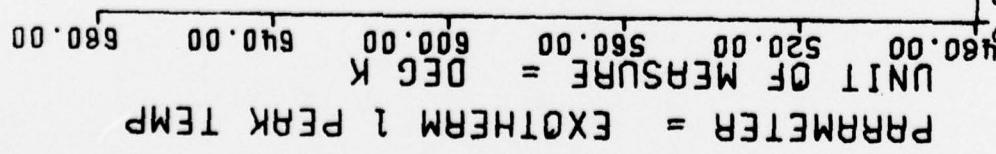


PARAMETER = ENDOOTHERM PERK TEMP

STAGE I WING 142 DIFFERENTIAL SCANNING CALORIMETER ENDOTHERM PEAK TEMP

FIGURE 55

$\gamma = ((+5.4485119E+02) + (+1.0420076E-01)) * X$
 $F = +3.7580516E+00$ SIGNIFICANCE OF F = NOT SIGNIFICANT
 $R = +9.6836759E-02$ SIGNIFICANCE OF R = NOT SIGNIFICANT
 $t = +1.9385694E+00$ SIGNIFICANCE OF t = NOT SIGNIFICANT
 $N = 399$ DEGREES OF FREEDOM = 397
 STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH

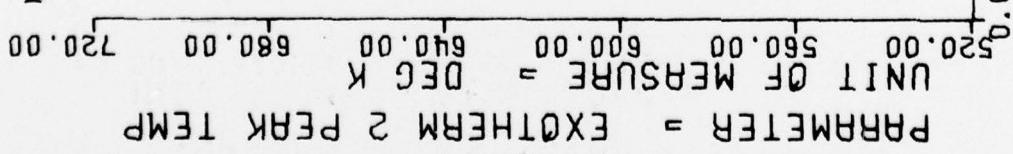


STAGE I WING 142 DIFFERENTIAL SCANNING CALORIMETER EXOTHERM 1 PEAK TEMP

FIGURE 56

$F = +1.2673663E+01$ SIGNIFICANCE OF F = SIGNIFICANT
 $R = +1.7588632E-01$ SIGNIFICANCE OF R = SIGNIFICANT
 $\lambda = +3.5600089E+00$ SIGNIFICANCE OF λ = SIGNIFICANT
 $N = 399$ DEGREES OF FREEDOM = 397

STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH



STAGE I WING 1&2 DIFFERENTIAL SCANNING CALORIMETER EXOTHERM 2 PEAK TEMP

FIGURE 57

* * * SAMPLE SIZE SUMMARY * * *

Age (MONTHS)	Nr. SAMPLES	Age (MONTHS)	Nr. SAMPLES
7.0	2	9.0	1
12.0	2	13.0	2
22.0	1	23.0	2
64.0	1	65.0	1
65.0	1	66.0	1
69.0	2	70.0	2
91.0	2	92.0	2
92.0	2	93.0	2
97.0	4	98.0	7
98.0	7	99.0	2
99.0	2	100.0	1
102.0	2	103.0	6
103.0	6	104.0	5
112.0	1	113.0	1
113.0	1	114.0	2
114.0	2	115.0	1
115.0	1	116.0	1
116.0	1	125.0	1
125.0	1	126.0	2
126.0	2	127.0	1
127.0	1	128.0	2
128.0	2	129.0	1

WING 162 STAGE 1 TGA PERCENT WEIGHT LOSS AT 250 C. 9 DEC C RISE/MIN

This sample size summary is applicable to figure 58

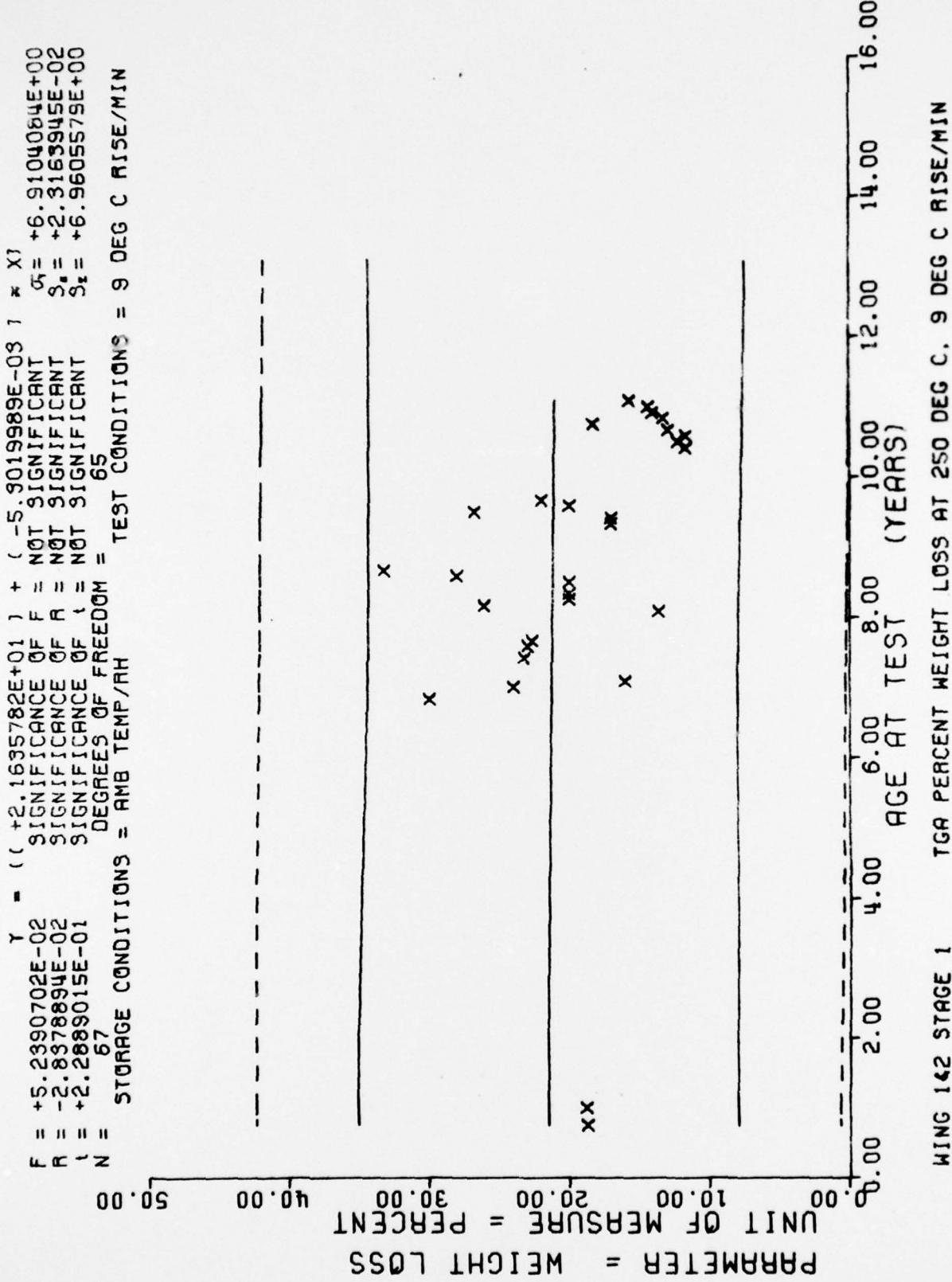


FIGURE 58

*** SAMPLE SIZE SUMMARY ***

AGE (MONTHS)	N ₀ SAMPLES	AGE (MONTHS)	N ₀ SAMPLES
60.0	6	120.0	1
120.0	4	127.0	1
80.0	4	134.0	6
64.0	4	149.0	5
65.0	4	130.0	2
220.0	2	131.0	6
61.0	4	142.0	6
92.0	7	135.0	4
57.0	5	134.0	5
56.0	9	135.0	10
59.0	4	136.0	14
100.0	5	137.0	8
101.0	2	138.0	2
102.0	6	139.0	5
103.0	2		
104.0	9		
105.0	3		
106.0	1		
107.0	3		
112.0	2		
113.0	3		
114.0	6		
115.0	2		
116.0	3		
125.0	2		

WING 162 STAGE 1 TGA PERCENT WEIGHT LOSS AT IGNITION. ♀ DEC C FISSEMIN

This sample size summary is applicable to figure 59

$\gamma = +9.1124501E+00$
 $F = +2.9578785E+01$
 $R = +1.3001983E-01$
 $t = +1.7642137E+00$
 $N = 189$
 STORAGE CONDITIONS = AMB TEMP/RH
 DEGREES OF FREEDOM = 181

$(+2.9578785E+01) + (+3.6563612E-02) * X_1$
 SIGNIFICANCE OF F = NOT SIGNIFICANT
 SIGNIFICANCE OF R = NOT SIGNIFICANT
 SIGNIFICANCE OF t = NOT SIGNIFICANT
 SIGNIFICANCE OF N = NOT SIGNIFICANT

UNIT OF MEASURE = PERCENT
 PARAMETER = WEIGHT LOSS

AGE AT TEST (YEARS)	0.00	2.00	4.00	6.00	8.00	10.00	12.00	14.00	16.00
WING 142 STAGE 1	xx	xx	xx	xx	xx	xx	xx	xx	xx

WING 142 STAGE 1 TGA PERCENT WEIGHT LOSS AT IGNITION, 9 DEG C RISE/MIN

FIGURE 59

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1. REPORT NUMBER 367(77)	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Propellant Surveillance Report LGM-30 A & B Stage I, TP-H1011		5. TYPE OF REPORT & PERIOD COVERED Test Results-Semi Annual
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) John A. Thompson		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS Propellant Lab Section Directorate of Maintenance OO-ALC Hill AFB, Utah 84406		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS MMEMP Project M72632-5MP116P
11. CONTROLLING OFFICE NAME AND ADDRESS Service Engineering Division Directorate of Material Management OO-ALC Hill AFB, Utah 84406		12. REPORT DATE April 1977
		13. NUMBER OF PAGES 112
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for Public Release, Distribution Unlimited		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Solid Propellant Minuteman		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report contains propellant test results from cartons of TP-H1011 bulk propellant representing LGM-30 A and B First Stage Minuteman Motors. This report is the twelfth time that a statistical approach has been used to analyze First Stage bulk carton propellant. Testing was accomplished in accordance with MMEMP Project M72632-5MP116P. The purpose of testing was to determine and provide early warning of any serious degradation trends occurring in the propellant for service life predictions. An analysis of all parameters indicates that no potential problems are expected in the propellant		

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for at least two years past the oldest data point.

Data stored in the G085 System were plotted utilizing the IBM 360-65 Computer and Cal-Comp Plotter. The data range at any age can be found by suitable inquiry of the G085 System.

Each point on the regression plot represents the mean of all samples at that particular age. The number of specimens at each point is indicated on the sample size summary sheet accompanying each regression plot or group of regression plots.